



**TECHNICAL SPECIFICATION  
FOR  
20' X 8' X 8'  
REFRIGERATED CONTAINER  
MGSS PANELS ON WELDED CORTEN FRAME**

- POLYURETHANE INSULATION
- M.G.S.S PANELS
- ALUMINUM FLOOR RAIL
- END FRAME : CORTEN
- LINING: SIDE , FRONT AND DOOR --STAINLESS STEEL  
ROOF-ALUMINUM
- SUBFLOOR : CORTEN
- REEFER UNIT : THERMO KING WKD-II 50 SR

MODEL NO : TL-09MGUK-A  
SPECIFICATION NO : TL-09MGUK-A-S

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**TECHNICAL SPECIFICATION  
FOR  
REEFER CONTAINER**

**1. GENERAL**

**1.1 Operational environment**

*The container described herein is designed for the carriage of frozen, chilled and environmental conditions imposed by these modes of transport.*

*The container will be able to withstand extremes of the ambient temperature variations from -30 °C to +50 °C and with a refrigeration unit to maintain the inside space temperature range of -25 °C to +25 °C without effect on the container strength and watertightness.*

**1.2 Standard and Regulations**

*The containers must be designed and manufactured under sufficient quality control in order to comply with following authorized classification societies, standards and regulations.*

**1.2.1 Germanischer Lloyd (GL).**

**1.2.2 ISO/TC-104**

*668 - Dimensions and Ratings. (4th Edition-1988/Amd.1-1995)*

*6346 - Coding, Identification and Marking. (1995 edition)*

*1496/2 - Specification and Testing.*

*Part 2: Thermal Container. (1996 edition)*

*3874 - Freight containers, Handling and Securing. (4th Edition-1988)*

*1161 - Specification of Corner Fittings. (1984 Edition)*

**1.2.3 T.I.R. : Approved by an authorized classification society.**

**1.2.4 C.S.C. : In compliance with "International Convention for Safe Containers" and approved by an authorized classification society.**

**1.2.5 Classification Society : Under sufficient quality control of the above mentioned classification societies and certified by an authorized classification society.**

**1.2.6 T.C.T. : No exposed timber components to be used.**

**1.3 Handling**

*The containers will be constructed to be capable of being handled without permanent deformation on following basis.*

**1.3.1 Lifting, loaded or empty, at top corner fittings vertically by means of spreaders fitted with hooks, shackles or twist-locks, regardless of any port crane speed.**

**1.3.2 Lifting, loaded or empty, at bottom corner fittings using slings with terminal fittings at any angle between vertical and 45 degrees to the horizontal.**

**1.4 Transportation**

*The containers will be constructed to be suitable for transportation in normal operation conditions and in the following modes.*

**1.4.1 Marine : Five (5) high stacked (on a level 24,000kgs ratings).**

**1.4.2 Road : On flat bed or skeleton chassis, secured by twist-locks or equivalent ones at the bottom corner fittings.**

**1.4.3 Rail : Suitable for rail transport under following modes.**

- COFC (Container-on-flatcar): secured by twist-locks or equivalent.
- Double stacking on the train.
- TOFC (Trailer-on-flatcar): secured to semi-trailer chassis.

## 2. DESIGN CRITERIA

### 2.1. Design Loadings

Floor	5,460 kg (12,040 lb)
Stacking	43,200 kg per post.

### 2.2. Air Leakage Rate (Q) (with refrigeration unit)

The air leakage is maximum 10 m<sup>3</sup>/hr when the inside pressure of the container is 25.4 mm water column.

### 2.3. Total Heat Leakage Rate (U) (with refrigeration unit)

The total heat loss of the container is maximum 22 Kcal/hr. °C at mean insulation wall temperature of 10 °C.

## 3. DIMENSIONS AND RATINGS

Dimensions are rated at standard temperature of 20 °C (68 °F).

3.1.	Max. Gross Weight	(R)	20,320 kg	( 44,800 lb )
	Tare Weight	(T)	3,300 kg	( 7,275 lb )
	Body Weight		2,928 kg	( 6,455 lb )
	Unit Weight		372 kg	( 820 lb )
	Payload	(P)	17,020 kg	( 37,525 lb )

3.2.	Overall	Length	6,058 +0/- 6 mm	( 19' 10 1/2" +0/-1/4" )
		Width	2,438 +0/-5 mm	( 8' 0" +0/-3/16" )
		Height	2,438 +0/-5 mm	( 8' 0" +0/-3/16" )

### 3.3. Door Opening

Width	2,196 mm	( 7' 2 7/16" )
Height	2,097 mm	( 6' 10 9/16" )

### 3.4. Insulation Thickness and Density

Roof	80 mm	40-45 kg/m <sup>3</sup>
Side Wall	61 mm	40-45 kg/m <sup>3</sup>
Front wall	66 mm	40-45 kg/m <sup>3</sup>
Door	90 mm	55-60 kg/m <sup>3</sup>
Floor	146.4/80.5 mm	55-60 kg/m <sup>3</sup>
Corners		40-45 kg/m <sup>3</sup>

### 3.5. Diagonal Difference

Maximum allowable difference between length of diagonals on the centers of the corner fittings:

Roof, Bottom & Side	max. 13 mm (1/2")
Front & Rear End	max. 10 mm (3/8")

### 3.6. Internal (Nominal)

Length	4,410 mm ( 14' 5 5/8" )
Width	2,292 mm ( 7' 6 15/64" )
Height	2,129 mm ( 6' 11 13/16" )

### 3.7. Forklift pocket dimensions (Nominal)

Width	360 mm ( 1' 2 11/64" )
Height	116 mm ( 4 9/16" )
Center distance	2,080 mm ( 6' 9 57/64" )

### 3.8. Cubic Capacity

Nominal Volume	21.5 m <sup>3</sup> ( 760 ft <sup>3</sup> )
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#### 4. CONSTRUCTION

##### 4.1. Floor

The floor is composed of corrugated sub-floor, and T-floor with insulation of polyurethane. The corrugated sub-floor is welded to the lower bottom side rails and forklift pockets. As the T-shaped board floor is all automatically welded, the board floor actually forms a one-piece floor construction and offers the best protection against water and air leakage and the impact wear and tear due to the movement of fork trucks and cargo in and out of the container. The rear end of the board is reinforced with aluminum extrusion.

Four (4) lashing bars to be installed between the outer two (2) floor tees on each side. Capacity equal to one (1) ton.

Four (4) drain holes are provided at the front and rear end of the container. There is the float Valve in the drain cover, which adjusts water in and out automatically.

Lower Bottom Side Rail	Corten A / Equivalent. 4.5 mm thick steel plate cold rolled form.
Floor Board	T-shaped extruded aluminum, 40 mm high A 6061-T6.
Forklift Pocket	Top hat section pressed steel, 6.0mm bottom plate, 6.0 mm, Corten A / Equivalent.
Sub-floor	Corten A / Equivalent, 1.6 mm thick with pressed corrugation.

##### 4.2. Roof

The roof is composed of several MGSS panels butt welded together by automatic TIG welding with corrugations facing upwards onto which hat section corten roof bows are welded to outer skin by spot welding. At the perimeter, the roof sheet is welded to the outside flange of the top side rail.

Roof	0.8 mm thick MGSS sheet with Die-stamped corrugations.
Roof Bow	Corten A / Equivalent, hat section, 1.6 mm thick.
Roof Lining	One-piece aluminum sheet, 0.9mm thick with small bead corrugations.

##### 4.3. Side Wall

The side wall is composed of top side rails, upper bottom side rails, MGSS panels, and hat section side posts which are welded to the outer skin by spot welding, the outer skin is composed of several MGSS panels butt welded together by automatic TIG welding. Several stainless steel sheets with small bead corrugations are welded together to form a one-piece lining.

Top Side Rail	Corten A / equivalent. 4.0 mm thick steel plate cold rolled form.
Upper Bottom Side Rail	Corten A / equivalent. 4.0 mm thick steel plate cold rolled form.
Side Panel	MGSS sheet with Die-stamped corrugations, 0.8mm /1.0mm.
Side Post	Hat section, 1.6 mm, Corten/Equivalent.
Side Lining	0.7mm thick SUS304 2B, with small bead corrugations.

##### 4.4. Front Frame

4.4.1 Front frame is composed of Corten steel frame members, which is constructed so that the refrigeration machinery can be fitted.

Front Corner Post	Corten A / equivalent, 4.0mm.
Front Sill	Corten A / equivalent, 4.0mm.
Front Header	Corten A / equivalent, 4.0 mm thick.
Corner Casting	Cast steel, JIS SCW49.

4.4.2. Front end wall is composed of corten steel frame members, and a recessed front panel, the front panel is composed of 1.2 mm thick M.G.S.S. panel and stainless steel inner lining with polyurethane insulation, which is constructed so that the refrigeration machinery can be fitted. MGSS front panel will be welded on Corten steel frame.

Front outer panel	MGSS, 1.2mm.
Front inner lining	SUS 304, 0.7mm.
Front support	SPA-H, 4.0mm

#### 4.5. Rear Frame and Door

Rear end wall is composed of corten steel frame and door. The rear door is for a split design, a larger door and a smaller door, which can be opened from the inside. The door is composed of 1.6mm thick MGSS panel, and stainless steel inner lining with polyurethane insulation. MGSS door panel will be riveted on aluminum door frame. Each door has four hinges.

Rear Corner Post	Corten A / equivalent, 6.0mm
Rear Header	Corten A / equivalent, 4.0mm.
Rear Sill	Corten A / equivalent, 6.0mm.
Door frame	Aluminum A 6061-T6 ,.
Door panel	MGSS, 1.6mm, thick.
Door Lining	Stainless steel sheet, 0.7 mm thick with batten, SUS304 2B.
Corner Casting	Cast steel, JIS SCW49.
Door locker	Stainless steel.
Hinge	Four per door, SS41.
Door gaskets (inner)	EPDM 'J' section.
Door gasket (outer)	EPDM 'C' section double lip .

#### 4.6. Refrigeration Unit: THERMO KING WKD-II 50 SR

#### 4.7 Machinery Mounting

Designed and fabricated according to refrigeration unit requirement.

### 5. PROTECTIVE TREATMENT

#### 5.1. Surface preparation

##### 5.1.1 Prior to assembly

- 1) All steel components (except MGSS), prior to forming will be shot blasted to Swedish Standard Sa2.5 to remove rust, mill scale etc..
- 2) MGSS components, prior to painting, will be cleaned to all oil and dirt etc..

##### 5.1.2 After assembly

- 1) All M.G.S.S. parts will be sweep blasted and cleared to remove all oil rust, dirt and etc..
- 2) Surface treatment for painting will be done blasting on welding seam-line and all welding slags, splatters and other foreign materials will be removed.

#### 5.2 Painted surfaces

##### 5.2.1 Steel parts

- 1) Exposed parts of steel (CORTEN) structure.

- shop primer	- 10 $\mu m$
- zinc primer	- 20 $\mu m$
- epoxy primer	- 40 $\mu m$
- Polyurethane top coating (RAL 6003)	- 50 $\mu m$
Total film thickness	- 120 $\mu m$

- 2) Exposed parts of stainless steel (MGSS only).

- epoxy primer	- 50 $\mu m$
- Polyurethane top coating (RAL 6003)	- 60 $\mu m$
Total dry film thickness	- 110 $\mu m$

##### 5.2.2 Under coating

- Zinc primer	- 30 $\mu m$
- Top coat: Bitumen wax.	- 200 $\mu m$
Total dry film thickness	- 230 $\mu m$ .

### 6. INSULATION MATERIAL

#### 6.1. Material

R141b blown rigid polyurethane foam.

- 6.2. *Flammability*  
SE class (Self-extinguishing).

- 6.3. *Method*  
In foamed sandwich panels. Acrylic adhesive is coated on the inner surface of aluminum panels and stainless steel inner linings.

## 7. MATERIAL SPECIFICATIONS (by JIS)

	Material	Yield Strength (min.) kg/mm $\square$	Broken Strength (min.) kg/mm $\square$	El. (min.) %
7.1. Steel				
a. Muffler Grade	(DIN 1.4003)			
Stainless Steel Frame	or YUS410W-M or R410-DH SUH409L or YUS409D	32  18	44  37	20  25
b. Steel Casting for Welded structure	SCW49	28	49	23
c. Carbon Steel Pipe	STK41	23	41	23
d. Carbon Steel Forging	S25C	27	45	27
e. Mild Carbon Steel	SS41	25	41	21
f. Stainless Steel	SUS304	21	53	40
g. Corten steel	SPA-H	36	50	22
7.2. Aluminum				
a. Al. Alloy Extrusion	A6061-T6	25	27	8
b. Al. Alloy Sheet	A5052-H32	16	22	5
7.3. Sealant				
P.E. Insulation tape :	Between steel and Aluminum			
PVC Foam Tape:	Panel lapping			
Sealant(Grey): Terostat 930	Interior of container			
sealant (Grey): Terostat 930	Exterior of container			
Butyl :	Under structure and hidden part			
7.4. Adhesive				
Acrylic :	Metal to metal			
Polyurethane :	Metal to nonmetal			

## 8. MARKINGS

- 8.1. All containers are to be marked in accordance with ISO latest standard, regulations and owner's specifications.
- 8.2. Decals shall be self adhesive kiss-cut cast vinyl film with back cutting.
- 8.3. Internal decals need to be combined "pictures and words".

## 9. TESTING AND INSPECTION

### 9.1. Prototype Container

A prototype container, built to the production design, is subjected to the following tests in accordance with the latest ISO standards (ISO 1496/2-1996) and certified by the Classification Society.

#### 9.1.1. Summary of Structure Tests

Maximum gross weight (R)	20,320 kg
Tare weight (T)	3,300 kg
Payload (R - T) (P)	17,020 kg



Stacking	43,200 kg/post
Lifting, top corner casting (2R-T)	37,340kg
Lifting, bottom corner casting (2R-T)	37,340kg
Lifting, forklift pocket (1.6R-T)	29,212 kg
Restraint (compression & tension)(Rg)	20,320kg/rail
Rear end wall test	6,330 kg
Front end wall test (0.4Pg)	6,808 kg
Side wall test (0.6Pg)	10,212 kg
Roof test	300 kg
Floor, axle load	5,460 kg
Transverse rigidity	15,240 kg/end
Longitudinal rigidity	7,620 kg/side

9.1.2. *Air Leakage Test (Each container)*

The container is tested for air leakage at a static internal pressure of 25.4 mm water column. Drain tubes are closed during the test. Maximum allowable leakage 10m<sup>3</sup>/hr.

9.1.3. *Thermal Test*

These tests will be carried out in accordance with ISO 1496/2.

9.1.4. *Dimensional Check*

The containers will be checked for specified dimension to ensure compliance with this specification.

## 10. **GUARANTEE**

10.1. *Workmanship and Materials*

The manufacturer shall guarantee the workmanship, design, construction and materials against any defect for one (1) year after the acceptance of the container.

10.2. *Paint System*

The paint system including workmanship and materials shall be guaranteed against such as corrosion, paint failure, color fading, discoloration and all other defects for a period of three (3) years. Corrosion shall be defined as rusting which exceeds RE3 (European Scale of Rusting).

10.3. *Marking System*

Marking decals, including workmanship and materials shall be guaranteed against any defect including but not limited to tenting, fading, discoloration, chalking and peeling for a period of five (5) years after acceptance of the container.